

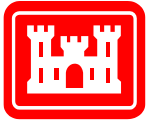
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of Engineers  
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# How the Army Meter Data Management System (MDMS) Can Help on the Path to Net Zero

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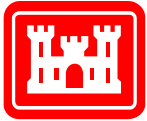
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*“The Army has identified six net zero pilot installations in each of the energy, water, and waste categories and two integrated installations striving towards net zero by 2020. This is a significant step in addressing the Army’s sustainability and energy security challenges.*

***Striving for net zero is operationally necessary, financially prudent, and critical to our mission.”***

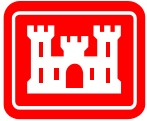
Hon. Katherine Hammack, Assistant Secretary of the Army (Installations,  
Energy, and Environment)

19 April 2011



# Net Zero Energy Defined

- **Net Zero Energy-** Defined as the amount of energy generated exceeding or equaling the amount of energy consumed over a period of time, usually one year.
- **Net Zero Energy Installation (NZEI) - NZEI** produces as much energy on-site or from nearby off-site renewable energy generation or through the use of on-site renewable fuels, as it consumes in its buildings, facilities, and fleet vehicles over the course of a year.



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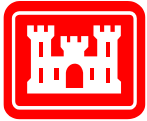
# Net Zero Goal Sites - by 2020

## NetZero Energy

- Fort Detrick, MD
- Fort Hunter Liggett, CA
- Kwajalein Atoll, RMI
- Parks Reserves Forces TA, CA
- Sierra Army Depot, CA
- West Point, NY

## Net Zero Integrated Installation (Energy, Water, and Waste)

- Fort Bliss, TX
- Fort Carson, CO

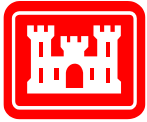


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# The Army Net Zero Hierarchy



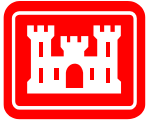
<http://army-energy.hqda.pentagon.mil/netzero/>



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# The Army path to Net Zero Energy

1. Reduce consumption
2. Repurpose inefficient usage
3. Deploy renewable on site generation



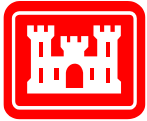
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*“I am amazed at the progress Army installations have already made to reduce energy and water consumption as well as waste generation.*

***We will all monitor the journey these installations embark on to reach the final net zero goal.”***

---Hon. Katherine Hammack, 19 April 2011---





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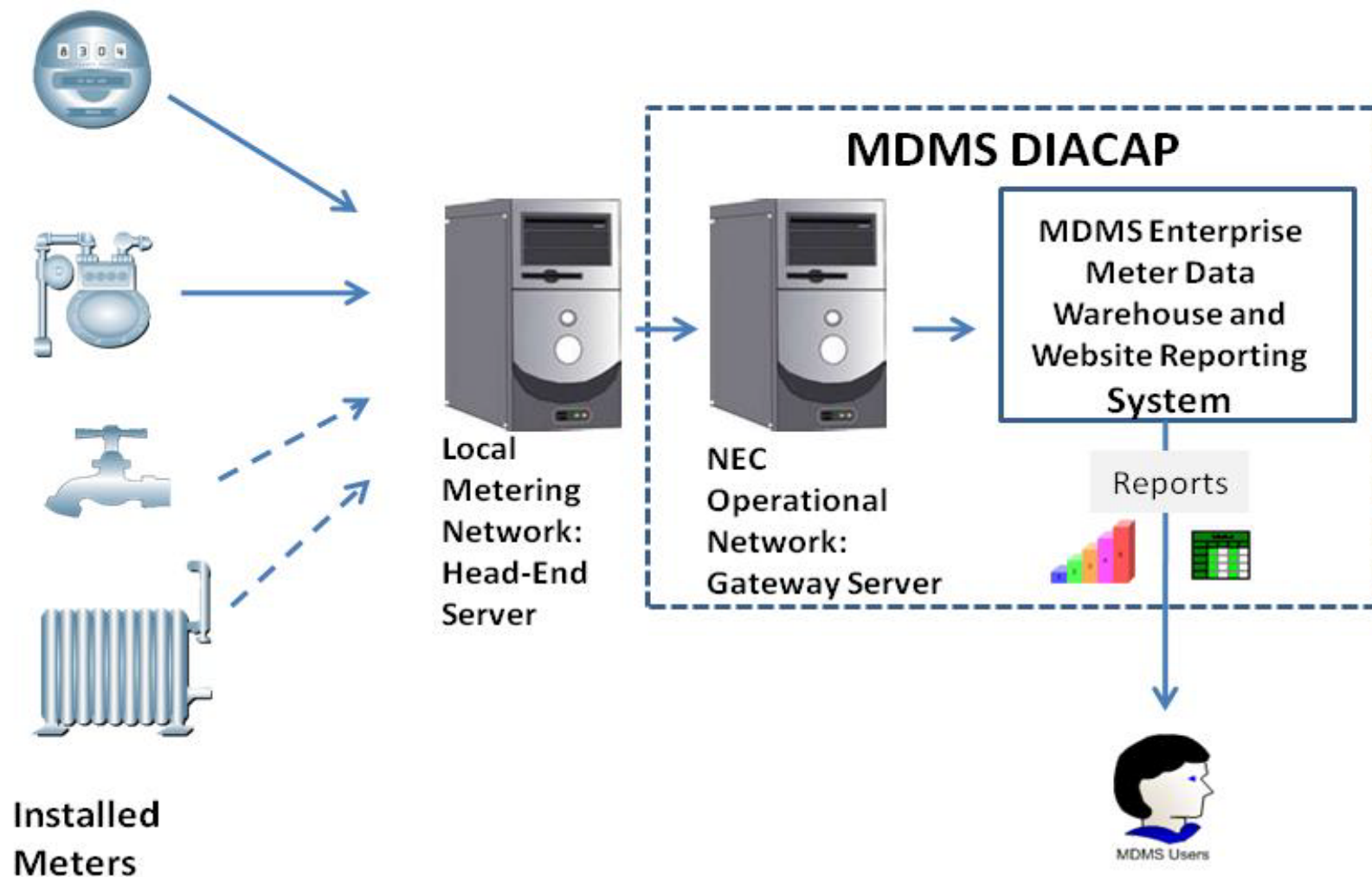
# The Army Meter Data Management System (MDMS)

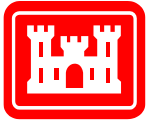
- MDMS is an enterprise system to track the Army's energy and water consumption worldwide
  - Tracks meter data from advanced meters in a central database
  - Automates meter data collection on a secure network
  - Makes energy information accessible via Army Engineering Knowledge Online (EKO) and MDMS Enterprise Portal through secured internet
- Provides Army installations the ability to track utility commodities consumption at the facility level



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# MDMS Overview

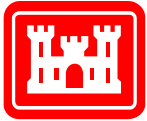




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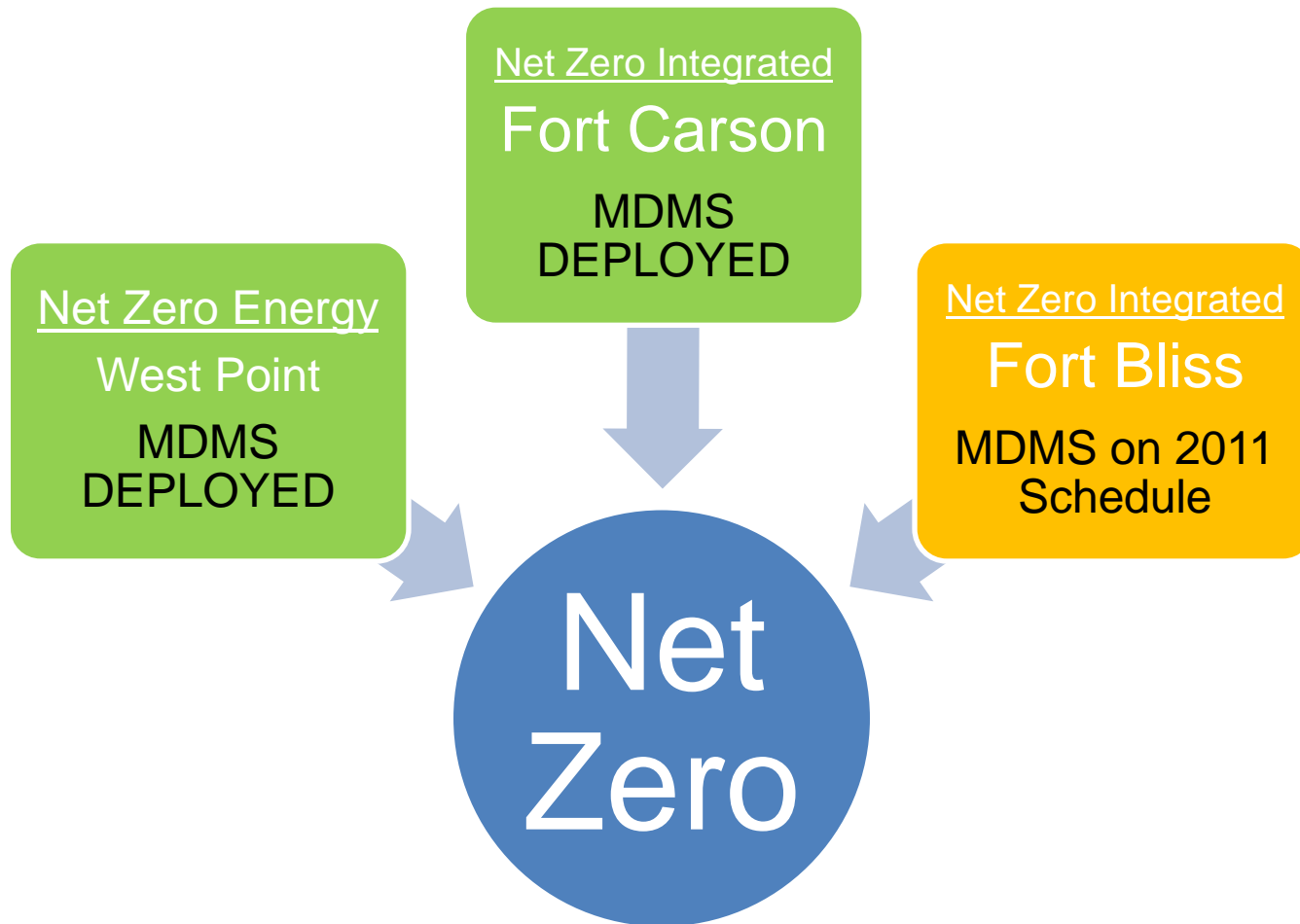
# MDMS Background

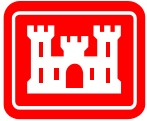
- Three locations have active meter reporting- over 195 meters as of 1 May 2011
  - Fort Carson
  - Fort Stewart
  - US Military Academy (West Point, NY)
- Meets DoD cyber-security requirements
  - Received Authority to Operate from Army NETCOM effective 23 April 2010
  - Received Certificate of Networthiness from Army NETCOM on 26 July 2010
- Over 195 meters reporting at 3 sites (05/01/11)



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# Leverage MDMS at Existing Sites

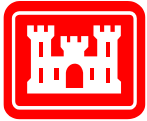




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# How MDMS supports Net Zero Goals

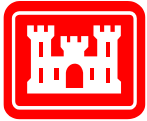
1. Measure existing consumption
  - a. Must know present values to define Net Zero trajectory
  - b. Must know where inefficient consumption exists to
    - i. Reduce consumption through efficiency projects
    - ii. Reduce consumption through renewable (non-generation) projects
    - iii. Reduce consumption through combined heat and power projects
    - iv. Reduce consumption peaks through time-of-use management
    - v. Repurpose consumption



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# How MDMS supports Net Zero Goals (cont)

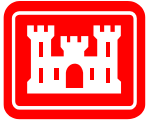
2. Validate Project reduction metrics and results (M&V)
3. Measure on site generation (PV, wind, CHP, others)
  - a. Must measure net and gross energy production
  - b. Must fully understand time and magnitude of total energy production
  - c. Must fully understand time and magnitude of total energy consumption
  - d. Must verify contractual production outputs for installed generation facilities



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# How MDMS supports Net Zero Goals (cont)

4. Measure Production/Consumption balance
  - a. Only way to demonstrate position on glide path to Net Zero
5. Provide critical input values to current and future Smart Grid applications



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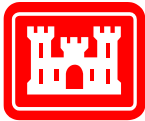
# Case Study

**The MDMS collected meter data from a single building.**

**The data collected:**

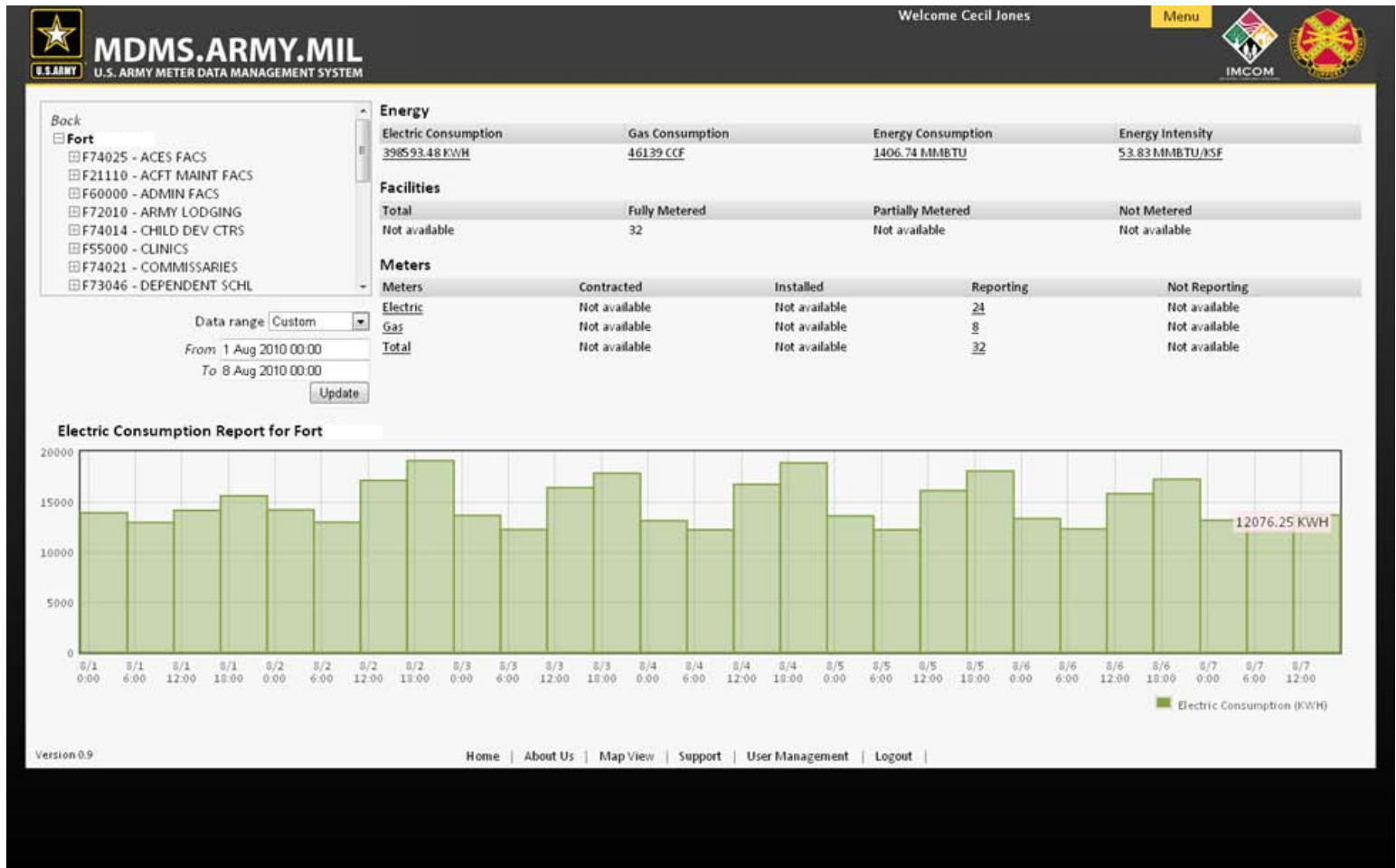
15-minute incremental electric (kWh) consumption data  
672 discrete data elements (every 15 minutes for 7 days)  
One full week (Sunday to Saturday)  
August 1 through August 7, 2010

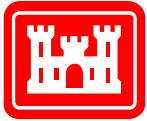




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# Initial Data from MDMS





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# Demand Analysis

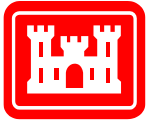
Consistent levels of consumption, day and night



Daytime average of 50 kWh every 15 minutes  $\approx 200\text{kW}$

Nighttime average of 30 kWh every 15 minutes  $\approx 120\text{kW}$

$\Delta$  is  $\approx 80\text{kW}$

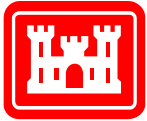


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# Clue: The Energy Delta

80	kW delta
80	hours/wk
52	weeks/year
332,800	kWh per year
61,595	SF
5.40	kWh/SF/year

5.4 kWh/SF/year is approximately half a typical lighting load, but typical if one third to half of the total SF is storage...

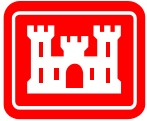


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# Energy Conservation Measures

Based on MDMS data and analysis, this facility is a potential candidate for:

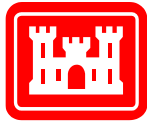
- Daylight harvesting
- Lighting automation
- Nighttime setbacks of other building systems, particularly air handling units (AHUs)



# Confirmation

During a site visit, we were able to confirm:

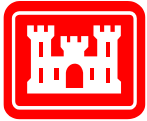
- The facility is not connected to the energy management system (neither heating or air conditioning systems are being set back at night);
- Lighting is manually controlled and is turned on at the beginning of the shift and off at the end of the shift; and
- The building is a single story, flat-roof building: ideal for solar and daylight harvesting.



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# Solar and Daylight Harvesting (Typical Project)

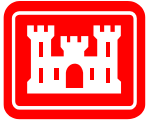
kWh per year for lighting						
	Reduction Percentages for Various Light Harvesting Projects					
Based on 332,800 kWh per year total for lighting	20%	30%	40%	50%	60%	70%
Annual kWh Savings	66,560	99,840	133,120	166,400	199,680	232,960
Approximate Square Feet of Solar Panels offset*	1,481	2,222	2,963	3,704	4,444	5,185
*Kyocera multi-crystalline 120w panels @ 12W/SF max and 90% grid tie conversion efficiency						
Solar Panel Calculation	120 watt panel					
X	80 hours per week					
X	52 weeks					
Equals	499.2 kWh per year gross					
X .90	449.28 kWh per year net					
Per	10 SF per panel					
Potential Harvest	44.928 kWh per year per SF					



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# Current MDMS Status

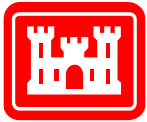
- Roll out operational system to 40+ large installations and 60+ Reserve sites
- Upgrade interoperability to allow for additional data point capture
- Integrate real property data
- Support tenant billing
- Establish help desk and training
- Upgrade reporting module to include more functionality and report flexibility



# Summary

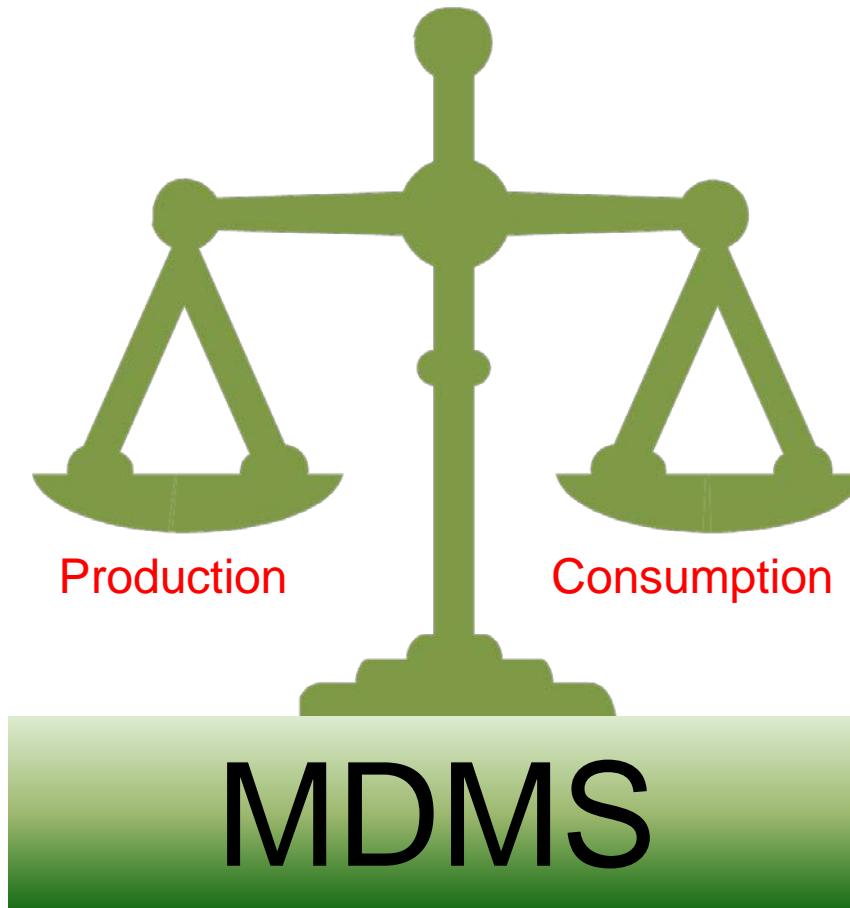
- Net Zero is a force multiplier and critical to our national security
- The Army's Meter Data Management System will be a key enabler to supporting this important initiative
- MDMS is naturally leveraged to advance and achieve Net Zero goals:
  - Net Zero requires timely and accurate energy and water consumption and time-of-use data
  - MDMS is positioned to retrieve the information, apply it to achieve Net Zero goals, and provide an advanced observation platform.

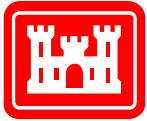




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# Visualize Net Zero Balance





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# Army MDMS Contacts

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# **BACK-UP SLIDES**

# The Army path to Net Zero Energy

1. Initiate the project
2. Establish energy and greenhouse gas baselines
3. Reduce demand through human action
4. Perform an energy efficiency assessment
5. Perform a renewable energy and load reduction assessment
6. Perform a transportation assessment
7. Perform an electrical systems assessment
8. Make energy project recommendations